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Hot deformation and processing maps of CNTs/Al composites fabricated by flake powder metallurgy

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ABSTRACT

The deformation behavior of as-sintered CNTs/Al-4Cu composite was investigated by isothermal compression tests, which were performed among temperature range of 573–823 K and strain rate range of 0.001–10 s⁻¹ with Gleeble-3500 thermal simulator system, and the height reduction was 60%. The flow stress–strain curves and the processing maps at strain of 0.1–0.6 were used to characterize the deformation behavior of as-sintered CNTs/Al-4Cu composite, the microstructures of the deformed specimens were also observed in this paper. The results show that the flow stress increases with the strain rate at a setting deformation temperature and decreases with temperature at a setting strain rate, the flow stress increases rapidly with the increase of the strain due to dislocation generation. The strain does have a little influence on the processing maps, the optimum processing domain is the temperature range of 620–660 K and the strain rate range of 0.06–0.3 s⁻¹, and the peak efficiency of power dissipation at a strain of 0.5 is about 33%.

KEYWORDS: sintered state, CNTs/Al-4Cu composites, flow stress, processing map